

## BlueSky Real-time Air Pollution Prediction System

BlueSky and its Rapid Access Information System (RAINS) are changing the way fire and smoke are managed. Since the project began in 2001, BlueSkyRAINS has helped land managers make quantitative decisions about smoke impacts and assisted operations on dozens of wildfires and hundreds of prescribed fires in the Northwest and Canada – fires that affected thousands of lives. By working directly with users, the BlueSky team has helped incident commanders employ BlueSkyRAINS for aircraft resource allocation, timing of burnouts, and public information. The team integrated BlueSkyRAINS into fuels and smoke management programs and helped states, tribes, and local air agencies improve and adapt the system for regulatory applications.



The BlueSky project has made significant progress in three of four goals of the NFP *10-Year Comprehensive Strategy*:

- *Improve Prevention and Suppression* by providing high-resolution weather and smoke predictions in GIS format to indicate location and timing of potential impacts well before dangers develop and in time to plan effective operations
- *Reduce Hazardous Fuels* by providing quantitative predictions for burn decisions, thus promoting collaboration between burners and regulators and allowing prescribed burns to occur more often, more efficiently, and more safely
- *Promote Community Assistance* by providing a publicly available graphic communication tool that clearly shows smoke impacts on sensitive receptors and community values

BlueSky was developed by the AirFIRE team of the PNW Research Station through collaboration with a consortium of members from the EPA, BLM, NPS, FWS, FS, and several states and tribes who meet at least annually to evaluate progress and discuss future direction. The consortium includes several committees on state-of-the-science, technology transfer, liaison with related projects, and user needs. Currently, BlueSky is available in every region through the Fire Consortia for Advanced Modeling of Meteorology and Smoke (FCAMMS). Administration-level negotiations are now under way to implement BlueSkyRAINS nationally.

BlueSky's integrative modeling framework and centralized processing have created a platform for rapid implementation of new science. Object-oriented programming allows components of fuel structure, fire behavior, consumption, emissions, dispersion, and weather to be quickly integrated, analyzed, and improved. Future development will allow "ensemble" predictions that employ all available fire tools. Ensembles allow estimates of impact probability and uncertainty from a range of deterministic answers – a considerable advancement in fire science.